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REPRODUCTION INHIBITORS FOR BIRD CONTROL

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ABSTRACT: Reproduction inhibitors are intended to maintain or control a population at a desired level; toxicants aim at elimination of the population.

Azocosterol hydrochloride (SC-12937; 20,25-diazocholestenol dihydrochloride) is a long acting inhibitor of ovulation in the pigeon (Columba liyia) by interfering with cholesterol synthesis and egg yolk formation. Corn impregnated with SC-12937 at the 0.1% level by weight and fed for 10 days has been found to inhibit or diminish reproduction for 5-6 months. Population turnover rate, mortality and longevity of the feral urban pigeon are also discussed.

The concept of reproduction inhibition, though under consideration for quite some time, has been greatly emphasized in the last years. It is part of the new creed -- Biological Control. The purists may argue its inclusion inasmuch as all action associated with its planning and carrying out are initiated and conducted by man. However, inhibition of, or reduction of reproductive capacity by chemical methods has a direct action on a vital biological activity without destroying the target animal whose role in the ecological scheme of things is thereby maintained. The non-productive target species does in fact serve as its own biological control to a marked degree.

REASON FOR A NEW APPROACH

Let us pass over the conditions requiring control of pest birds. These are well known to us. Why the interest in generating a new control approach or approaches different from the current methods? The more obvious answers are:

(1) The existing methods did not do an effective job -- either short-term, or more often, in the long run.

(2) The existing methods created hazards to other forms of wildlife or desirable species.

(3) Pollution of the environment generally.

(4) Hazard to people.

(5) Some more humane methods are too expensive.

(6) Many control methods were repugnant to large numbers of people.

PREVIOUS RESEARCH CONDUCTED

Much work has been done over the years in trying to find a satisfactory inhibitory agent. Elder (1) conducted experiments using tranquilizers, gametocides, anti-thyroid compounds, pesticides, coecidiostats and sex hormones. Inhibitory effects were noted in many instances but duration of effect was not sufficiently long. Also, some compounds' apparent activity could well have emanated from the malaise and debility produced in the target pigeons. A review of the literature reveals a paucity of information on the hormonal pattern in avians, and certainly in pigeons, as compared to our knowledge in mammals. The almost total dependence on the hypophyseal/pituitary sequence coupled with the short duration of action of most hormonal substances (administered other than daily or by a continuous release mechanism), mitigates against success with these types of compounds. (2).

CURRENT RESEARCH WORK

At the present time, the compound 20,25-diazacholestenol dihydrochloride (SC-12937), whose mode of action is not related to hormonal interference, shows definite inhibitory effects. Elder (1) has shown that SC-12937, fed for 10 days at a level of 0.1% in food, inhibits or diminishes reproduction in feral pigeons for 5-6 months. More extensive field trials conducted by Wofford and Elder (3) and by Woulfe and Gramlich (4) have supported Elder's findings and resulted in greatly diminished pigeon populations in the towns treated. In the town of Bangor, Maine, the bird population was reduced from some 2500 to 400 in three years of treatment. The population is being maintained at this low number at this time.

Additional work in a warmer climate conducted by Beckwith and Shortemeyer (5) in Florida, revealed a similar pattern of reduction. However, efficacy was impaired by baiting too late in the season after the major reproductive surge had already taken place. Effects were better and more easily assessed in the discrete flock at Ocala as compared to the diffuse population and feeding pattern pertaining in Jacksonville. Acceptance of bait in the warmer climate was no problem.

MODE OF ACTION OF SC-12937

This compound is known to interfere with synthesis of cholesterol at the mevalonic acid and desmosterol levels in mammals (6). Cholesterol is thought to be an essential component of egg yolk and possibly of the yolk membrane. In addition, the compound showed (in humans), anti-hyperlipidemia activity (6). We know that lipogenesis occurs in the liver (7). Deposition of yolk lipids may well therefore be interfered with to a point where the formation of an embryo or survival of a formed embryo is prevented. This concept is given weight (though not proven) by Searle's labeled metabolic studies showing that the compound is stored in the liver. These studies also revealed the half-life (T2) of SC-12937 is 28-1/2 days. This explains the unique long-acting effect of the compound in vivo through its slow metabolic release.

EXPERIENCES IN APPLICATION OF TREATED BAIT

Elder (1), Woulfe and Gramlich (4), and Elder and Wofford (3), have described baiting techniques and suggested methods of using a chemosterilant subsequent to use of toxicants, or combining its use with other methods. We have only used the chemosterilant by itself.

After several years of use in the field, the most important points coming to the fore are:

(1) Adequate distribution to feeding areas. There is a tendency to assume all pigeons in town feed at one of two sites where large numbers are seen. While some inter-flock movement occurs, pigeons tend to maintain discreet flocks and feeding places. All feeding places must be sought out and baited.

(2) Feed on dry ground or on a dry roof top. Feed away from buildings, tall grass, etc., Pigeons like open space.

(3) Feed in the morning to get bait into the females. Put out enough to last all day, except in parks where children, dogs, etc., may interfere.

(4) Bait early; before the Spring upsurge gets underway.

MORTALITY AND POPULATION TURNOVER

As might be expected, collection of data on mortality and turnover rate in a wild pigeon population has been almost impossible to assess.

Birds identified at a rate of some 20-25% of population in Bangor have the following spring appeared at rates of 0-8% on retrapping. Admittedly, numbers were quite small. To my knowledge, there are no data on the normal natural attrition rate in flocks of urban pigeons uninfluenced by man's control methods. Dr. Murton, U.K. Ministry of Agriculture, Fisheries, and Food, in a personal communication, stated that trapping data in an English industrial city, show two years, seven months, to be the average life span of feral pigeons in that city. This figure is much lower than has previously been estimated, especially in England's mild climate. We can with justification surmise that the survival rate in the snow and colder zones of the United States is less still. We do not know this, but with recruitment of young almost eliminated, the precipitous drop in pigeon numbers in Bangor is more easily explained. Complete data on our Florida (5) work is not available at present.

DISCUSSION

The reference data listed together with the comments above show that a pigeon population can be successfully controlled with a non-hormone chemosterilant impregnated bait. It has been suggested that a permanent sterilizing agent would be better. I question this premise on the grounds of the short life of an urban pigeon versus the danger to other species and possible hazard to man and his animals unless bait is made available with extreme caution. Adequate acceptance then becomes a problem.

Use of chemosterilant in migratory birds poses numerous problems compared to the static urban pigeon flock. Treatment of winter roosts with aerosol compounds, compounds absorbable through the feet to be sprayed on trees, etc., are under consideration, but a long acting compound, noninjurious to the environment, preferably species specific, has yet to be found.

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